Klamath National Forest
Best Management Practices

REGION 5
EVALUATION PROGRAM
WATER QUALITY
MONITORING REPORT
2006

March 13, 2007

Evaluation of Forest Service administered projects including timber sales, roads, grazing, prescribed fire, mechanical mastication, recreation sites, and common variety minerals activities.

www.fs.fed.us/r5/klamath/projects/forestmanagement/forestplan/reports/resourceplanreports/

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KLAMATH NATIONAL FOREST
2006
BEST MANAGEMENT PRACTICES (BMP)

SUMMARY

Calendar year 2006 was the fifteenth year of the Best Management Practices Evaluation Program (BMPEP) on the Klamath National Forest and the Forest Service Pacific Southwest Region (Region). This program is designed to evaluate how well the Forest and the Region implement BMPs and how effectively the BMPs control water pollution from National Forest lands. Onsite evaluations have been divided into 28 evaluation categories that reflect related timber, roads, mining, recreation, vegetation management, fire, watershed and range practices.

The Klamath Forest's BMPEP is composed of two sampling strategies. The first is the evaluation of randomly sampled sites, where data are collected and entered into a Regional database. The second strategy is non-random monitoring, in which sites are selected based on management interest in specific ongoing projects. These sites are often evaluated concurrently ("real time") and can be qualitative. Most randomly sampled site evaluations require that 1 to 2 winters have passed prior to completing the field assessment; however, two protocols (snow removal and in-channel construction) require at least one sample per site to be done during the active project phase. The site evaluations followed protocols described in Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User's Guide (USDA, Forest Service, 2002). In cases where the sample pool is very small, either all eligible sites are evaluated, or selection is done in a way that does not bias which sites are selected. The results of the random and non-random evaluations are summarized here separately.

Randomly sampled sites: In 2006, 45 sites were randomly drawn from Forest activity pools and each was reviewed for BMP implementation and effectiveness. Timber (10 sites), road engineering (20 sites), recreation (2 sites), grazing (1 site), vegetation manipulation (3 sites), revegetation of disturbed areas (5 sites), fire (3 sites) and mining operations (1 site) activities were evaluated. Sites were located on Oak Knoll, Happy Camp, Salmon River, Scott River, and Goosenest Ranger Districts.

BMP Implementation was evaluated to determine whether: (1) we did what we said we were going to do to protect water quality; and (2) project environmental documentation and/or contract/permit language was sufficient to protect water quality. BMP effectiveness was evaluated to determine if water quality protection measures met objectives. The objective for meeting most evaluation criteria is keeping all sediment out of channels and near-channel areas. Sediment deposition presence, volume and proximity to the nearest watercourse were used to indicate levels of water quality protection.

Table 1 summarizes the results of the **BMP Random Site Evaluation Program for 1992 through 2006**. Sites that partially meet evaluation criteria are not tallied in the "fully successful" group.

Table 1. BMP Random Site Evaluation Program from 1992 through 2006.

Monitoring Years	Total # of Sites Monitored	Sites Meeting BMP Evaluation Criteria			
		Implementation		Effectiveness	
		# of Sites	% of Total Fully Successful	# of Sites	% of Total Fully Successful
1992	53	29	55%	43	81%
1993	77	61	79%	72	94%
1994	52	39	75%	46	89%
1995	77	64	83%	74	96%
1996	57	48	84%	56	98%
1997	60	60	100%	59	98%
1998	61	38	62%	30/35	86%
1999	38	25	66%	34	89%
2000	45	40	89%	43	96%
2001	64	56	88%	61	95%
2002	53	49	92%	47	96%
2003	51	51	80%	45	90%
2004	53	50	94%	53	100%
2005	48	46	96%	47	98%
2006	**45**	**42**	**93%**	**45**	**100%**

In 2006, BMPs were fully implemented at 93% of the sites evaluated and effective at 100% of the sites evaluated (water quality was protected at some sites even if BMPs were not fully implemented). This represents a slight change in BMP implementation (a 3% decrease) and effectiveness (a 2% increase) compared to 2005. Dividing the years 1992-2006 into three 5-year groupings enables the evaluation trends to be more apparent. Table 2 shows the improvements made in BMP Implementation and Effectiveness through time.

Table 2. Implementation and Effectiveness success rate through time.

5-Year Group	Implementation Success Rate	Effectiveness Success Rate
1992-1996	75%	92%
1997-2001	81%	93%
2002-2006	91%	97%

Difficulty with BMP Implementation and/or Effectiveness has plagued "In-Channel Construction" (BMP E13; Table 3) over the last 5 years. BMP evaluations indicate R30 (Dispersed Recreation Sites) and M26 (Mining Operations) both have had implementation problems 2 out of the last 5 years. BMP evaluation G24 Grazing has had effectiveness problems in 2 of the last 5 years.

Table 3. BMPs with Implementation and Effectiveness problems over the last 5 years.

BMP	No. of years with Implementation Problems	No. of years with Effectiveness Problems
E09	1	1
E10	1	1
E11	1	0
E13	**4**	1
E14	1	0
E16	1	1
R22	1	1
R30	**2**	0
G24	0	**2**
M26	**2**	1
M27	0	1

An Action Plan will be developed during 2007 to analyze the problems with the BMPs in Table 3 so the proper corrective actions can be implemented to solve these problems.

Non-Randomly sampled sites: Several sites were selected for concurrent monitoring because the activities and their proximity to watercourses pose a potentially high risk for sediment discharge. These sites are not included in the numeric summaries in Tables 1, 2 and 3. They are discussed in the Non-Random Site Results summary section.

The report suggests how to continue the trend of improved monitoring results by ensuring proper implementation and further refining the effectiveness of BMPs.

Appendix 1 provides a "cross-walk" between the BMPEP protocol alpha-numeric identifier and the BMPs it assesses.

BMP MONITORING REPORT

INTRODUCTION

On-site evaluations are the core of the BMP Evaluation Program. There are 30 different evaluation procedures designed to assess a specific practice or set of closely related practices. Though the evaluation criteria vary based on the management activity, the evaluation process is similar. The Regional Office annually assigns the type and number of management activities to be evaluated on each Forest. The specific sites for each evaluated management activity are randomly selected from Forest project pools. Statistical analyses are periodically performed from the collective Regional data, and annual reports of Region wide BMP implementation and effectiveness are presented to the State and Regional water boards.

The criteria for sample pool development are Regionally standardized by activity type and described in the BMPEP User's Guide (2002 revision). Some minor changes in the forms for E10 (road decommissioning) and G24 (grazing) resulted from field protocol testing on the Forest in 2005.

In addition to the random sample sites, projects are selected that are of management interest with regard to timely water quality protection implementation. Evaluation of non-randomly selected sites is often called "concurrent" BMP monitoring because it is accomplished while the project is actively operating. Feedback is immediate and remedial action can be taken. However, comprehensive assessment of BMP effectiveness is not possible since there has not been a post-project winter season to test the protection measures. Besides the BMPEP, contract compliance monitoring is done concurrently, and assesses BMP implementation along with other project resource protection measures.

BMP monitoring strives for an interdisciplinary evaluation of projects and involves project proponents and watershed personnel. This interdisciplinary effort provides direct feedback to the project proponent on how well the BMP was implemented and allows for adaptive management on future project designs.

Earth scientists Juan de la Fuente, Tom Laurent, Roberta Van de Water and William Snavely worked with District personnel to conduct BMP evaluations in 2006.

Randomly Sampled Site Monitoring

Data collection methods are specific for each BMP and are described in the BMPEP User's Guide (USDA, Forest Service, 2002). One KNF modification is that BMP evaluations which require soil cover monitoring use the Forest's soil cover monitoring procedures developed in 1998.

Data gathered are identified for each BMP and used to answer specific questions on BMP evaluation forms. Management activities (e.g. timber projects, roads, prescribed fire, tractor piling) to be evaluated must : 1) be implemented under a NEPA decision; 2) adhere to contract requirements; and 3) have been completed for at least one but not more than 3 winters prior to evaluation. In-channel construction and snow removal BMP evaluations (E-13 and E-17, respectively) are conducted during the activity or immediately after completion.

The timber, silvicultural and engineering project sample pools were developed from a list of closed timber sales. Decommissioned road samples were taken from the Forest wide Decommissioned Roads Database. The prescribed fire sample pool was developed from a list of completed prescribed fire projects. The recreation sample pool included all known developed and dispersed recreation sites on the Forest. The grazing sample pool was a list of active grazing allotments on the Forest.

Non-Randomly Sampled Site ("Concurrent") Monitoring

Data collection was similar to that used for randomly sampled sites; however, some data may be more qualitative than those collected using the strict Regional protocol. Often the same forms are used, but data are not entered into the database or numerically scored. Narrative reports often present or supplement the evaluation. The primary difference between concurrent and randomly selected sites is that typically no significant runoff has occurred since project implementation because the site visit is usually done during the active phase of the project. In 2006, several road reconstruction projects (for fish passage and stream flow capacity) and wet weather timber sale operations were evaluated. A prescribed fire project in the wilderness (the first on the Forest) had a September reconnaissance-level monitoring assessment of soil and water resource protection success. The Wet Weather Operations (WWO) sites were evaluated as a condition of contract operations and agency policy and the road reconstruction projects were evaluated as part of a cooperative administrative study with the University of California assessing BMP effectiveness.

SUMMARY BY PROJECT TYPE

Results are from random sample sites (unless stated otherwise).

Timber Activities

T01 Streamside Management Zones (2 sites)

Two harvest units (39 and 64) were reviewed from the Ken Del Timber Sale on the Goosenest Ranger District. The SMZ as located on the ground varied from 25 to 50 feet on either side of an intermittent stream. **All of the sampled SMZs met BMP implementation and effectiveness evaluation requirements.**

T02 Skid Trails (4 sites)

Randomly selected skid trails in four ground-based yarded harvest units (5, 30, 34 and 39) in the HCFP03 Timber Sale on the Happy Camp Ranger District were evaluated. The water bar failure rate was 2%. One of the sampled skid trails crossed an intermittent channel when it was dry. **The skid trails met all evaluation criteria for BMP implementation and effectiveness.**

T04 Landings (4 sites)

Six log landings were reviewed in the HCFP03 Timber Sale in units 5, 30, 34, and 39. All met project BMP and contract requirements. This included waterbars and/or outsloping of the surface, which were observed to effectively disperse runoff; there was no evidence of concentrated flow. Those landings met the standard implementation practices and were fully effective at dispersing drainage, controlling erosion and sedimentation. **The log landings met all evaluation criteria for BMP implementation and effectiveness.**

Road Engineering Activities

E08 Road Surface, Drainage and Slope Protection (3 sites)

Road reconstruction/maintenance was evaluated on three roads (17N10.4, 17N12.2 and 17N56.2) within the HCFP03 project on the Happy Camp Ranger District. **Road 17N10.4** reconstruction resulted in a well functioning road. There was new surface rock aggregate placed over an old chip sealed surface. No evidence of erosion was noted. One culvert outlet had evidence of a very old scour. **Road 17N12.2** reconstruction involved surface blading and repair of channel crossings which resulted in a well functioning road. No erosion problems were observed. **Road 17N56.2** work included opening the road and removing encroaching brush. Removed vegetation was placed on turnouts at outside bends in the road. No erosion problems were noted except for a few rills/ruts due to winter traffic**. All three sites fully met BMP implementation and effectiveness requirements.**

E09 Stream Crossing (4 sites)

Four road-stream crossing sites were evaluated on the Happy Camp Ranger District. These crossings occur on roads 17N10.4, 17N12.2 and 17N56.2. The crossing on road **17N10.4** was an intermittent stream culvert. This site met all road design requirements and was a well functioning crossing. The crossing on road **17N12.2** was a perennial stream culvert. This site met all road design requirements and was a well functioning crossing. **Road 17N56.2** had minor fill slope stabilization problems. It was noted that more rock was needed on the fill slope of one low water crossing. High storm flow in the winter of 2005-2006, the insufficiency of rock armoring resulted in flow diversion around the armoring and erosion of an area 6 feet wide by 1 foot deep (~2yds^3). Soil cover on the fill slope was also inadequate. The second crossing evaluated was a rock fill on an intermittent stream. The site evaluation indicated that this was a well constructed rock crossing/fill and no erosion was observed**. All 4 sites met BMP implementation and effectiveness requirements for fill slope erosion and stability, culvert-related erosion potential, and road surface erosion.**

E10 Road Decommissioning (4 sites)

Two road decommissioning projects on the Oak Knoll Ranger District (roads 46N61A and 46N62), one on the Salmon River Ranger District (road 40N42.1) and one on the Happy Camp Ranger District (18N13) were evaluated. Three of the four roads did not meet BMP implementation requirements; however, all four evaluated roads met effectiveness evaluation requirements. The evaluator noted that implementation and effectiveness were generally good; however, implementation received a failing score because one road intersection with the main road was not effectively obliterated and on two roads, crossing fill material was not totally removed at all crossing sites. The degree of effect from these shortfalls on the decommissioning work was noted to be insignificant, and effectiveness was good for all four road projects. We believe the current database scoring methodology results in inaccurate scoring; more detailed discussion of this issue is found later in this document (Adaptative Management Discussion and Recommendation section, part 4). **Three out of the four sites failed to meet BMP Implementation requirements and all four sites met BMP Effectiveness criteria.**

E11 Control of Sidecast Material (3 sites)

The three roads (17N10.4, 17N12.2 and 17N56.2) on the Happy Camp Ranger District were evaluated for side casting of road materials. These three roads were used during the HCFP03 project. **All sites fully met BMP Implementation and Effectiveness requirements to control sidecast.**

E13 In-Channel Construction Practices (2 sites)

Two in-channel construction sites on two channel crossings in the Bowerman road stormproofing project (road 10N04) on the Salmon River Ranger District were evaluated. Effectiveness was fully met, because there were no discernable differences in riffle substrate upstream and downstream of the project; there was no turbidity plume persisting >20 channel-widths downstream and no construction material was left in the channel or on the floodplain post-project. **Both of these sites fully met all BMP Effectiveness and Implementation requirements.**

Five non-random fish passage reconstruction sites from previous years were assessed for effectiveness after being tested for one winter. Three sites were on the Happy Camp Ranger District and two sites were on the Scott River Ranger District. All sites had experienced high stream flows and functioned well, with a minor amount of bank erosion and vertical streambed adjustment which was anticipated by project planning and design. Fine sediment deposition in the substrate downstream was minimal or not visible. These sites were sampled as part of a larger administrative study to assess in-channel construction practices effectiveness. **These five sites met all BMP Implementation and Effectiveness requirements.** (See Appendix B for more details)

E14 Temporary Road Construction (1 site)

One temporary road that accessed unit 39 of the HCFP03 project on the Happy Camp Ranger District was evaluated. This temp road was a 700 foot long spur of road 8CO05. No channels were crossed by this temp road. This road was a reconstructed older existing temp road. **All project BMP Implementation and Effectiveness requirements were met.**

E16 Water Source Development (1 site)

One water drafting site on road 18N12, within the HCFP03 project area on the Happy Camp Ranger District was evaluated. There was no evidence of erosion at this site. **This site fully met all BMP Implementation and Effectiveness requirements.**

E17 Snow Removal (1 site)

One snow removal activity was assessed on the road leading to the Lake Mountain Lookout. Snow plowing was done to open the access road to the lookout. **All requirements for BMP Implementation and Effectiveness were met for this road.**

E19 Restoration of Borrow Pits and Quarries (1 site)

The Mathews Creek rock quarry on the Salmon River Ranger District was evaluated. The rock material from this quarry was used for the Sign Creek fish passage project and stormproofing of road 39N24. **All requirements for BMP Implementation and Effectiveness were fully met for this quarry.**

E20 Management of roads during wet periods (7 non-random sites)

Monitoring using this protocol is non-random. Bias is eliminated by sampling all timber sale operations that are operating outside the Normal Operating Period (NOP). Wet weather operations standards apply during this period and within the NOP if wet weather, e.g. thunderstorms, occurs. The Jack Heli Timber Sale on the Scott River Ranger District and six sales on the Goosenest Ranger District (Pomeroy TS, Whaleback TS, Erickson TS, East West Plantation Thin, South Plantation Thin and Sheep Rock Juniper Product Removal) were selected for monitoring because they were operating out side the NOP. All were closely monitored and corrective measures were proactive, resulting in water quality and soil resource protection. **All BMP Implementation and Effectiveness requirements were met.** (See Appendix B for more details)

Recreation Activities

R22 Developed Recreation Sites (1 site)

One developed recreation site, Red Bank Campground on the Salmon River Ranger District, was evaluated. **This site met all BMP Implementation and Effectiveness criteria.**

R30 Dispersed Recreation Sites (1 site)

One dispersed recreation site (Lower Sky High Lake shelter) was visited. **This site met all BMP Implementation and Effectiveness criteria.**

Range Management Activities

G24 Range Management (1 site)

The Upper Meeks Meadow Grazing Allotment on Scott River Ranger District was evaluated. All implementation criteria were met. Site specific standards and guidelines pertaining to streambank disturbance have not been developed and incorporated into the annual operating plan, grazing permit, or allotment management plan as of the site visit (10/10/06). Seven of the 9 effectiveness criteria were rated at the highly effective level and two (bank stability and lentic habitat disturbance) were rated at the moderately effective level. The sampled channel reach had 70-80% stable banks (high rating is >80%). Less than 10% of lentic habitat was disturbed by livestock hoof prints, trails or rilling. A high rating would be rendered if there was "little or no evidence" of such disturbance. The site passed implementation but did not achieve a passing score for effectiveness. We believe the current database scoring methodology results in inaccurate scoring. Data displayed in Table 1 for this BMP assumes that the site met BMP Effectiveness criteria based on manual scoring. See the Adaptive Management discussion, under item #3**. Overall, this range allotment met all BMP Implementation and Effectiveness criteria.**

Fire Management Activities

F25 Prescribed Fire (3 sites)

Three prescribed burn units were monitored on the Scott River Ranger District (Canon TS unit 28 and Scott Bar Mountain underburn units 1 and 3 . Effectiveness criteria include an upslope evaluation (soil cover, etc.) and evidence of sediment deposition near or in the channel. No SMZ were within these units**. These three burn units met all BMP requirements for Implementation and Effectiveness.**

One non-random prescribed burn in the Marble Mountain Wilderness (Red Rock Prescribed Burn) was monitored prior to the first winter. It was estimated that well over 80% cover was retained in the burned areas. **This burn met all the BMP requirements for Implementation and Effectiveness.**

Minerals Management Activities

M26 Mining Operations (1 site)

One stream dredging operation on the Salmon River Ranger District in the upper South Fork of the Salmon River was evaluated. **The evaluation indicated that the operation had fully met all BMP Implementation and Effectiveness requirements.**

Vegetation Management Activities

V28 Vegetation Manipulation (3 sites)

Three mastication units (96, 97 and 99) of the St. Claire Elk Forage Improvement project on the Salmon River Ranger District were evaluated for soil cover, rutting and erosion. Post-treatment soil cover ranged from 97-99%. No ruts or erosion were observed. **All three mastication units met all BMP Implementation and Effectiveness criteria.**

V29 Revegetation of Surface Disturbed Areas (5 sites)

Three road decommissioning projects on the Oak Knoll Ranger District and two fish passage projects were evaluated for revegetation success (seeding and mulching on an outsloped prism) and slope stabilization. One of the road decommissioning sites met 80% of the soil cover objective but passed the BMP effectiveness requirement. Straw mulching and grass seeding at the fish passage sites was less than desirable but surface rock fragments were sufficient to meet soil cover guidelines. **All five of the sites met all BMP Implementation and Effectiveness requirements.**

Table 3. Summary of 2006 BMP Implementation and Effectiveness Success Rate by Individual BMPs. (Randomly sampled sites only)

BMP	Total # of Sites	IMPLEMENTATION		EFFECTIVENESS	
		# of Sites Meeting BMP Criteria	% of Total	# of Sites Meeting BMP Criteria	% of Total
T01	2	2	100	2	100
T02	4	4	100	4	100
T04	4	4	100	4	100
E08	3	3	100	3	100
E09	4	4	100	4	100
E10	4	1	25	4	100
E11	3	3	100	3	100
E13	2	2	100	2	100
E14	1	1	100	1	100
E16	1	1	100	1	100
E17	1	1	100	1	100
E19	1	1	100	1	100
R22	1	1	100	1	100
R30	1	1	100	1	100
G24	1	1	100	1	100
F25	3	3	100	3	100
M26	1	1	100	1	100
V28	3	3	100	3	100
V29	5	5	100	5	100
Totals	45	42	**93%**	45	**100%**

SUMMARY OF NON-RANDOM SITE EVALUATIONS

RESULTS SUMMARY

All evaluated non-random sites met all BMP implementation and effectiveness requirements. See Appendix B for site specific details.

ADAPTIVE MANAGEMENT DISCUSSION AND CONSIDERATIONS

The following discussion is divided into 1) practices that are working well, 2) practice applications that can be improved, 3) practices to consider for possible modification at the Forest level, 4) Evaluation Protocol and Database Functional problems that require Regional level fixes, and 5) Practices that need to be considered for modification.

1. Practices that are working well

Most of the 19 activities evaluated in 2006 met BMP compliance and were effective at controlling nonpoint pollution. These included all timber sale activities; all vegetation, fire, minerals management activities, and recreation sites; and most road engineering activities. Management should continue to use these practices on all future projects.

2. Practice applications that can be improved

The 2006 project BMPs were effective; however, implementation could be improved as follows:

E10 Road Decommissioning

The 2006 evaluation of this practice indicated that minor problems such as inadequate road closure obstruction, incomplete removal of fill material where culverts were removed and restoring channel gradient to something other than natural gradient occurred.

Closer inspection by engineering and earth science staff would help rectify these issues before final project acceptance and contract closure.

3. Practices to consider for possible modification at the Forest level

E 10 Road Decommissioning

Limiting rock armoring to only culvert outlets may be less effective than armoring all channels on a road restoration project. An interdisciplinary team of an earth scientist, fish biologist and engineer should develop Forest wide criteria for use of riprap which would lead to better project consistency. A review of the "design test" by the 2006 flood flows (similar to evaluations of stormproofing projects post 1997 by Elder, 2003) on decommissioned crossings may provide a learning opportunity that can result in better decommissioning designs. This opportunity should be considered for the 2007 season.

V29 Revegetation of Surface Disturbed Areas

Soil cover was evaluated at 2 fish passage sites and it was noted that the organic cover from placed straw and grass seed was less effective than desirable. Current engineering contracts call for the application of 3000 pounds/acre of California certified weed-free straw. Contract language should be modified to include a soil cover requirement of >90% from applied straw mulch. The modification might read: "Apply approximately 3000 pounds per acre of California certified weed-free straw to achieve 90% or better effective soil cover adjacent to water courses. Effective straw cover is achieved when straw blades or fibers overlap in a random manner and is approximately 1 inch matted thickness following rainfall."

G24 Grazing

Grazing over-utilization of riparian areas is a concern for water quality and beneficial uses. Range management situations encountered in 2006 included localized trampling of meadows and streambank areas. The effects at the 2006 sites are not likely to persist over time. The 2006 sites also met the BMP compliance criteria because the Forest lacks site specific water quality/riparian standard and guidelines assumed by evaluation protocol. Although this rating factor is inapplicable, there are problems with the database (see item #4).

In 2002, Forest range staff began formulating objectives for streambank disturbance and woody plant utilization on allotments that have vulnerable stream channels; however, this effort was never finalized. In September 2005, a proposal was made by Forest fisheries, soils, and hydrology staff to revise the Forest Plan grazing standards and guidelines to include one for streambank disturbance. The proposal is being reviewed by range management and Forest planning staff.

4. Evaluation Protocol and Database functional problems that require Regional level fixes

G-24 Grazing

There are unresolved difficulties with the protocol and how it is scored. The 2001 evaluation protocol used requires measuring specific stream bank disturbance and woody plant utilization against Forest or Annual Operating Plan (AOP) objectives for implementation success. The specific objectives are not included in the Klamath NF AOPs; however, "Not Applicable (NA)" is not a permissible answer in the evaluation process and scoring. The effectiveness scoring is automated such that any item not met at its highest level causes the entire site to fail, including a single moderate rating. This feature is not consistent with other BMPEP protocols, and has the effect of using the BMPEP as a de-facto standard set at 70% or greater streambank length undisturbed.

M26 Mining Operations

The implementation scoring process in the database needs to be corrected. Under Implementation, if you answer yes (yes implies successfully meeting each evaluation criteria) to every evaluation item, the database will score the implementation as failed. The scoring system scores implementation with greater than 60 points as failed. The total number of points scored when successfully meeting all evaluation requirements is 206 points.

E10 Road Decommissioning

The weighted Implementation evaluation criteria need to be reviewed. Implementation should not fail if there is a minor departure from contract/project requirements for one criterion. It's reasonable to fail implementation if there is a major departure from contract/project requirements.

5. Practices that need to be considered for modification

Table 3 in the summary indicates that BMPs associated with in-channel construction projects (E13) have had implementation problems 4 out of the last 5 years. Analyzing the actual project numbers indicates that 53% of the projects evaluated failed the implementation criteria while only 7% failed the effectiveness criteria over the last 5 years. The major implementation problems are associated with not adequately removing excavated/stockpiled materials from the channel and/or floodplain (5 failures). The second reason was the requirements for dewatering/diversion of flow were not met (3 failures). The third reason was that the disturbed channel was not returned to natural or the designed grade (1 failure). In 2007, the BMP evaluations identified in Table 3, especially E13, will be thoroughly analyzed and an Action Plan will be written. This plan will develop recommendations which will be implemented in order to solve the implementation and effectiveness problems these BMPs have been having over the last five years.

CONCLUSIONS AND CONSIDERATIONS

In 2006, implementation standards for BMPs were fully compliant on 93% of the sites evaluated. BMP effectiveness requirements were met on 100% of the sites evaluated. This represents a very slight change from 2005. Further improvement in BMP implementation is needed in road decommissioning (E10). Suggestions made in the Adaptive Management discussion can improve BMP performance. An Action Plan will be developed in 2007 that prioritizes and provides solutions that will correct BMP issues.

The majority of practices evaluated in 2006 are highly successful, owing to management's commitment and the training and experience of project planners and implementers. This needs to be encouraged in order to continue the Forest's BMP successes.

Appendix A. BMP Evaluation Procedure Names and Descriptions.

Procedure #	*Procedure Name (BMPs Monitored)*
T01	Streamside Management Zones* (BMP 1.8, 1.19, 1.22)
T02	Skid trails (BMP 1.10, 1.17)
T03	Suspended yarding (BMP 1.11)
T04	Landings (BMP 1.12, 1.16)
T05	Timber sale administration (BMP 1.13, 1.20, 1.25)
T06	Special erosion control and revegetation (BMP 1.14, 1.15)
T07	Meadow protection (BMP 1.18, 1.22, 5.3)
E08	Road surface, drainage and slope protection (BMP 2.2, 4, 5, 10, 23)
E09	Stream crossings (BMP 2.1)
E10	Road Decommissioning (BMP 2.26)
E11	Control of side cast material (BMP 2.11)
E12	Servicing and refueling (BMP 2.12)
E13	In-channel construction practices (BMP 2.14, 2.15, 2.17)
E14	Temporary roads (BMP 2.16, 2.26)
E15	Rip rap composition (BMP 2.20)
E16	Water source development (BMP 2.21)
E17	Snow removal (BMP 2.25)
E18	Pioneer road construction (BMP 2.3, 2.8, 2.9, 2.19)
E19	Restoration of borrow pits and quarries (BMP 2.27, 2.18)
E20	Management of roads during wet periods (BMP 2.24, 7.7)
R22	Developed recreation sites (BMP 4.3, 4, 5, 6, 9, 10)
R23	Location of stock facilities in wilderness (BMP 4.11)
G24	Range management (BMP 8.1, 8.2, 8.3)
F25	Prescribed fire (BMP 6.3)
M26	Mining operations (Locatable minerals) (BMP 3.1, 3.2)
M27	Common variety minerals (BMP 3.3)
V28	Vegetation manipulation (BMP 5.1, 5.2, 5.5, 5.7)
V29	Revegetation of surface disturbed areas (BMP 5.4)
R30	Dispersed Recreation Sites (BMP 4.5, 4.6, 4.10)

Appendix B Non-Random BMP Monitoring

E13 In-Channel Construction Practices

Five 2005 fish passage projects were visited in June, 2006 to assess post-winter effectiveness. Three sites were on Happy Camp District, and one was on Scott River District. Several high flows during the winter tested the new structures. While the storms resulted in facility damage on over two dozen sites scattered throughout the Forest, the sampled fish passage sites were functioning well and showed minimal erosion. The sampled sites were all part of the UC Berkeley administrative study. The following is a summary of BMP effectiveness observations for the suite of inchannel construction BMPs. Results from the UCB study, which used several instream indicators of BMP effectiveness should be available later this year or in 2008.

Bishop Creek at 15N08 spur crossing – The upstream right bank showed adjustment, with fresh-looking erosion of approximately 40 cubic yards, caused by a small cave-in or, more likely, a temporary diversion into the bank. The upstream riprap is intact with the exception of some washing away of rock 3 ft upstream from the inlet on the right bank. The downstream riprap was intact except for some loss 3-5 ft from the left bank.

The channel substrate looked clean 50 ft downstream with no surface fines and little or no fresh gravel. At 75 and 100 ft, the channel was similar with fines and gravel comprising an estimated 5% of the substrate.

Stanza Creek at 15N06 crossing – A small debris jam formed immediately downstream from the inlet. Another one, apparently much older and larger (5 ft high) is entraining sediment 60 ft upstream. This is probably stable. The small one, however, is causing minor erosion on the left and right banks (totaling around 5 cubic yards) due to the stream having cut around the new debris jam. Also, another area of minor erosion (< 1 cy) occurred due to an upstream adjustment on the left bank. There has been vertical adjustment of the channel bottom immediately downstream (~ 3 ft), but it appears to be stable. Engineers confirmed that this amount of adjustment was planned in the design. The substrate in a pool 30 ft downstream contains an estimated 25% fines, 70% cobble, and 5% boulders. The substrate particle sizes 50 ft downstream is similar.

Upper Elk Creek at 45N19 crossing – The upstream banks are stable with no apparent erosion, even though minor downcutting occurred 60 ft upstream from the site. Downstream banks are also stable, although there is evidence of minor downcutting (to 1 ½ feet) as indicated by exposed roots. The substrate in a pool 150 ft downstream contains from <10% coarse gravel to 60% cobbles and 40% small to medium-size boulders.

Upper Boulder Creek at 40N17 crossing – Both upstream and downstream banks were all heavily riprapped. This site has been through two winters, and the ditch erosion that was reported after the first winter is stabilizing and becoming covered in grass. The downstream substrate could not be seen through the snowmelt-generated whitewater that extended some distance downstream.

Lower Boulder Creek at 44N45 crossing – There has been considerable vertical channel adjustment, which was anticipated due to the steep gradient at this site. Upstream, an alder fell in on the right bank.

Downstream, there is an adjustment on the right bank due to woody debris diverting flows against this oversteepened slope. This should be monitored after/during next winter's high water to ensure that the fillslope on the west approach isn't undermined as the channel readjusts. A remedy would be manipulation of instream boulders and large wood to shift the main channel flow away from this slope.

E20 Management of Roads during Wet Periods

End of FY 06 Season Notes
Wet Weather Operations BMP Monitoring
Scott River District

The following summary is based on monitoring conducted by the Forest's timber sale administration staff. Although there were several sales operating on the east side of the Forest (Goosenest RD), the main focus of this summary is west side sales. The east side activity is summarized below, although the 2006 activity on the east side did not pose a water quality risk or threaten beneficial uses of water. Sale activities were closely monitored for road facility damage and soil rutting.

Jack Heli Timber Sale

Jack Heli was the only active sale operating outside the NOP on the westside of the Forest. Monitoring occurred on the following days on Jack Heli:

1/03/06 – Road 40N17 and Landing #13: haul began. Access to landing is rutted. Remedy: contractor will waterbar nightly. Road surface at mile marker 23 is pumping water during traffic. Remedy: contractor will divert water to inside ditch. Roads are otherwise draining well, and stable. Contractor is monitoring conditions.

1/07/06 – Sale area: Conditions stable and contractor is monitoring erosion control measures. Area at mile marker 23 still pumping, so remedy is to flag off area for trucks to avoid. Continue nightly waterbarring on landing access road.

1/11/06 – Landing #13: Contractor applied more rock to access road. Storm front moved through area today. Truck haul terminated after 1 round and ground crew sent home at noon.

1/17/06 – Road 40N17: late night rains melted snowpack. Will assess road conditions tomorrow morning (1/18). Log haul was terminated after 1st truck at 0700.

1/18/06 – Contractor shut down haul operations due to wet conditions.

1/24/06 – Landing #13: FS and contractor agreed that contractor will assess landing and temp. access road in spring for maintenance of soil erosion control measures, and that purchaser will perform post-haul blading in the spring once the road surface has dried sufficiently.

1/30/06 – Landing #11, 12, and 13: landings require erosion control stabilization prior to final approval.

End of FY 06 Season Notes
Wet Weather Operations BMP Monitoring
Goosenest District

Pomeroy Timber Sale

Logging activities were accomplished on ice and packed snow, preventing soil disturbances. Purchaser suspended operations in unit #3, accessed by the road 43N65 until water on road surface dries out.

1-25-06 No hauling on roads due to muddy conditions.

2-2-06 Purchaser's Representative (PR) diverted water off of 44N23 road and plowed slush off 19 road (paved road).

3-22-06 Roads 44N60, 44N60B are solid overall with some pot holes developing. Purchaser has water barred and broken out berms where necessary to drain water. Haul route is out upper road, 44N60B to the 44N23 road to avoid wet conditions on bottom end of 44N60 road. Road conditions on road 43N23 remain stable with packed snow on surface. The 43N60 road is freezing overnight and surface is thawing in the afternoon. Field Rep. (FR) is monitoring conditions. Haul route continues out top of unit to road 44N23 where conditions are more stable.

4-5-06 Haul route shut down by Field Rep. due to wet, sloppy conditions on road 43N60.

4-10-06 Field Rep is keeping erosion control measures current with operations.

4-20-06 Operations shut down due to wet conditions. All equipment moved off sale area until conditions dry. Road has been bladed and gate closed at bottom to allow road to stabilize.

Whaleback Timber Sale

4-10-06 Road 43N65. Soft spot in road prevents access to Unit 6, Landing #3.

4-26-06 Construction Inspector (CI) Leslie Burkhart inspected roads 43N65 and 43N18. Contract requires purchaser to improve road surface at his expense prior to hauling. PR opted to suspend haul on 43N18 road to do the road work on the 43N65 road, installing fiber cloth and rock in order to continue hauling.

4-27-06 PR intends to blade roads at end of day today so roads can dry over the weekend.

5-2-06 Erosion control measures met by skidding on snow.

5-9-06 Water bars being built on skid trails. PR is diverting water off road 44N63 and blading surface.

5-18-06 Erosion control measures minimally met on skid trails and landings. Areas will be re-entered

for bio-mass removal and more permanent erosion control measures will be implemented at that time.

Erickson Timber Sale

1-24-06 Harvesters finding some soft spots in unit 24. Sale Administrator (SA) required the operators to avoid the soft areas.

1-26-06 Road 44N23 held up good today. Hauled 8 loads with no problems.

2-22-06 Road 44N23 holding up fairly well with few soft spots. Logger is monitoring haul to avoid excessive damage. Unit 16 ground conditions solid, operations will move in and try one landing.

3-8-06 Unit 16, ground started thawing, PR shut down operations. Field Rreresentative (FR) will plow roads to remove some snow and pack snow to freeze.

3-17-06 Unit #24 skid trails and landing #27 getting soft. FR shut down operations. Conditions will be monitored by PR and SA to determine when to recommence operations.

5-10-06 Roads in sale area are ready to grade. Skid trails and landing still have standing water.

5-11-06 Soft spots on the skid trail are pumping water. Operations are suspended until ground dries out.

5-12-06 3-4 loads of logs will be hauled today with remaining volume on landing hauled 5-15-06.

5-15-06 Ground conditions allowed remaining down volume to be skidded and hauled. Most skid trails have been back bladed and water barred. NW portion of backline to Landing #27 skid trail were not restored. PR shall complete this work when operations resume next season. Road 44N23.17 in unit #16 needs to be back bladed. Logging operations are completed for the season.

East West Plantation Thin, South Plantation Thin, and Sheep Rock Juniper Product Removal Sales

Logging operations were active on ice and packed snow. There was no need for corrective actions with these projects.

F25 Prescribed Fire

Red Rock prescribed burn had ample post-burn soil cover remaining. Small concentrations of Large Woods Debris (LWD) were burned, however, most of the LWD was retained, and well over 80% soil cover remained.